

Fund-raising While Learning Molecular Biology

Hands-on lab experiment for students and even parents!



Genes in a Bottle™ Kit:

How to Turn a Science Experiment into a Fund-raiser

My entry level biology classes raised over \$300 for our science department.



Perrin Belway,
Terra Nova High School,
California

The Genes in a Bottle Activity in Action

The Genes in a Bottle laboratory experiment can be formatted into a fund-raising activity that enables a class, school, science club, or district to generate funds for the science teaching budget. In contrast to asking for a generic donation for “science lab fees,” this hands-on activity provides a much more creative and interactive way to generate funds.

Invite Students’ Parents to Explore the Same Activities that Your Students Do!

Bio-Rad’s Genes in a Bottle activity is a perfect entry-level biotechnology exercise in which your students and their parents can explore biotechnology side by side. The activity can be done for the first time as a parent-student partnership, or if your students have already done the activity in class, they can be the teachers and guide their parents through the process. Either way, the parents will be more engaged in their kids’ learning, which is a win-win situation for all!

Perfect for Several Types of Events

Because this is an entry-level biotechnology activity, this lab is perfect for the beginning of the year at Back-to-School Night, at parent-teacher night, or at the end of the year to summarize and reinforce concepts learned during the year.

As a fun midterm event, the heart shape of the necklaces provides a tie-in to Valentine’s Day. Invite the parents into the class for a day, or have students make a surprise Valentine’s DNA necklace for their parents!

The Science Behind the Kit

Make your biology personal. Introduce your students to molecular biology with their own DNA! Enable your students to see the normally invisible substance of life and begin to comprehend the meaning of their own genetic makeup. In this activity your students employ the same real-world laboratory procedures used to extract DNA from many different organisms for a variety of biotechnology research applications. Students extract genomic DNA from their own cheek cells, then precipitate and bottle it in a glass amulet. The DNA amulet, or necklace, provides a permanent keepsake of each student’s DNA.

Dependable Support Included with Each Kit

- Curriculum, including Teacher’s Guide
- Student manual
- Graphic quick guide
- Free downloadable PowerPoint presentation
- Free downloadable activity station posters
- Free customer and technical support



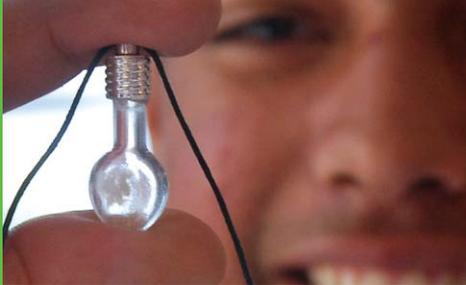
Genes in a Bottle Kit

Complete Genes in a Bottle kits contain sufficient materials for 36 students.

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Visit us on the Web at explorer.bio-rad.com or call us at 1-800-4BIORAD (1-800-424-6723)

Biotechnology
Explorer CAPTIVATING™ SCIENCE EDUCATION



“Bio-Rad has always led the way to proliferation of biotechnology into classrooms. Their well-designed kits are focused on specific applications that we want and need. They also provide equipment at a reasonable cost to educators.”

Mark Adame / St. Mark's School, Texas

Doing the Math

How a lab activity can raise funds for your science department

Planning Your Event Day

You'll have to prepare your classroom to accommodate the activity and the participants. Simply arrange your desks or lab benches into four "activity stations" for each step of the experiment.

1. Cheek cell collection
2. Cell lysis and proteolysis
3. DNA precipitation
4. Necklace assembly

Additional materials that are needed but are not supplied in the kit include alcohol (91% isopropanol or 95% ethanol), marking pens, and small paper cups.

One or two activity helpers are recommended to accelerate the experiment. With this level of support, 72 necklaces can easily be constructed in a one hour period. As more activity helpers are added, a classroom full of people can easily construct hundreds of necklaces in a couple of hours.

Event Promotion

To generate as much interest and excitement as possible, promote the fund-raiser in advance. Ideal ways of promoting include sending a flyer home, advertising in an electronic school newsletter, or even submitting a brief write-up to the local newspaper. For a small (\$10) donation, participants can experience a real experiment. Introduce the surrounding school community to science!



Great added participant treat!
(see below for details or to order)

Estimate Your Fund-raising Efforts

| Number of Participants | Total Funds Raised (\$10 fee per necklace) | Cost of Supplies (kits and misc. supplies) | Net Funds Raised (Wow!) |
|------------------------|---|---|----------------------------|
| 36 | \$360 | \$150 | \$210 |
| 72 | \$720 | \$300 | \$420 |
| 108 | \$1,080 | \$450 | \$630 |
| 144 | \$1,080 | \$450 | \$630 |
| 360 | \$3,600 | \$1,500 | \$2,100 |

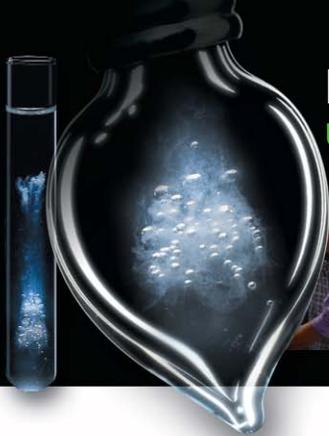
Kit Ordering Information

| Description | Catalog # | List Price | EDU Price |
|--|-------------|------------|-----------|
| Genes in a Bottle Kit , provides material for 36 students, includes 1 DNA extraction module and 2 DNA necklace modules (ships and stores at room temperature) | 166-2300EDU | \$167.50 | \$134.00 |
| Available Separately: | | | |
| Description | Catalog # | List Price | EDU Price |
| DNA Extraction Module , includes DNA extraction materials for 36 students | 166-2000EDU | \$118.75 | \$95.00 |
| DNA Necklace Module , includes 18 amulet necklaces | 166-2200EDU | 41.25 | 33.00 |
| Genes in a Bottle DNA Extraction Refill Package , includes lysis buffer and powdered protease + salt | 166-2001EDU | 46.25 | 37.00 |
| Lysis Buffer , 150 ml | 166-2002EDU | 26.25 | 21.00 |
| I Love Your DNA Tattoos , pack of 200 temporary tattoos | 166-2004EDU | 26.25 | 21.00 |

Educational discounts apply only to items ordered with an EDU suffix. EDU price discounts are for qualified educational institutions and educators only.

Fund-raising Checklist

Using the Genes in a Bottle™ Kit



Streamlining Your Fund-raising Efforts

To help you get started and run a successful fund-raising activity with your Genes in a Bottle kit, the following checklist will guide you through each step of the process. The fund-raising activity uses a streamlined protocol that is less complex and more efficient than the process described in the instruction manual (bulletin #4110034) found in the kit. Before starting this activity, read through the entire instruction manual to become familiar with the lab activity.

- 1. Read fund-raising flyer** (bulletin 5903) **and determine the number of kits needed**
- 2. Order Genes in a Bottle kit(s)** (catalog #166-2300EDU) **for activity** (2–3 weeks prior to fund-raiser)
- 3. Read instruction manual for the DNA Extraction Module and the DNA Necklace module** (1 week prior to fund-raiser)
- 4. Download and print the Activity Station posters** (3–4 days prior to fund-raiser)
- 5. Purchase additional supplies not provided in the kit:**
 - Small paper cups (optional): 36 per kit needed
 - Alcohol (91% isopropanol or 95% ethanol): 360 ml per kit needed
 - Permanent marking pens: 8–10 pens for Activity Station 1
 - Plastic zip top bags: 36 per kit needed
 - Small scissors for trimming stoppers: 8–10 pairs for Activity Station 4
 - Nail polish remover (for excess superglue removal)
- 6. Prepare reagents** (1 day prior to fund-raiser)
 - Add one package of Powdered Protease + Salt powder to the 150 ml bottle of Lysis Buffer. Swirl to dissolve. This is the protease/salt/lysis buffer used in Activity Station 2.
 - Aliquot 2 ml of the protease/salt/lysis buffer into colored micro test tubes (36 tubes per kit needed)
 - Chill alcohol by placing in freezer overnight
 - Aliquot 3 ml of water into 15 ml tubes (36 tubes per kit needed)
- 7. Prepare zip top bags of reagents** (1 day prior to fund-raiser)

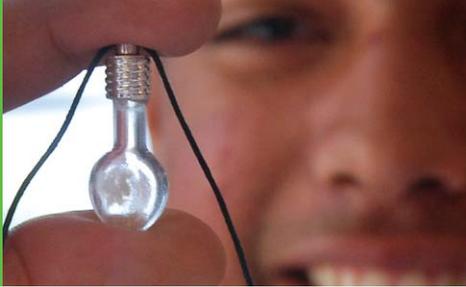
To each zip top bag, add:

 - 15 ml conical tube containing 3 ml of water
 - Colored micro test tube with protease/salt/lysis buffer
 - One disposable transfer pipet
 - Necklace components (vial with stopper, cord, cap)
- 8. Set up classroom for fund-raiser** (2–3 hours before fund-raiser)
 - Evenly space the 4 Activity Stations
 - Activity Station 1 should contain a zip top bag of reagents and a small paper cup for each participant
 - Activity Station 2 should have sufficient room for participants to lyse cells
 - Activity Station 3 should contain cold alcohol sitting on ice
 - Activity Station 4 should contain small scissors, superglue, paper towels, and nail polish remover



Genes in a Bottle Kit

Have fun!



“From career entry to mastery, Bio-Rad provides standards-based professional development for educators at the K–12 and undergraduate levels. And it is clear that teachers do need professional development in this vital and rapidly evolving area of science to effectively integrate it into their existing lesson plans.”

Let us know how your fund-raiser went!

Thank-you Gifts — You Get Both!

Bio-Rad T-shirt



Cool Cotton T-shirt

I Love Your DNA Tattoos



200 Temporary Tattoos

Tell us about your fund-raiser experience and you'll receive a free Bio-Rad T-shirt and I Love Your DNA Tattoos.

Please provide the following information and email a copy to biotechnology_explorer@bio-rad.com.

Your name _____

Your school _____

Contact information (school address and email address) _____

How you heard about this fund-raiser _____

Type of fund-raiser (Back-to-School Night, Valentine's Day, Science Fair, etc.) _____

Amount of funds that were raised _____

Brief description of your fund-raising event: What went well, room for improvement, etc. _____

- Be sure to include pictures (if available) from your event!
- Email to biotechnology_explorer@bio-rad.com



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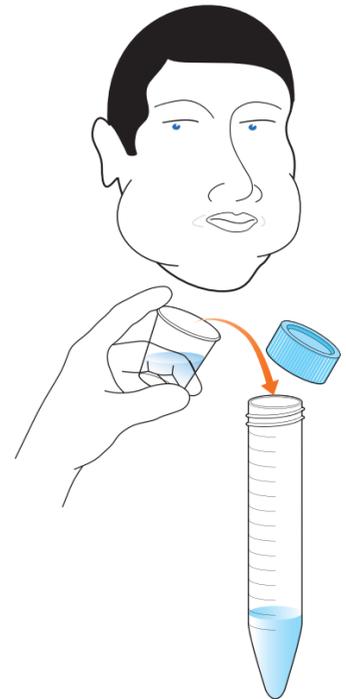
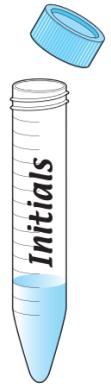
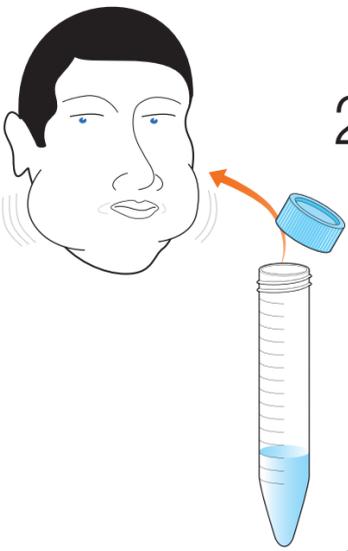


1

Cheek Cell Collection

At this station, you will collect your cheek cells in a 15 ml conical tube using a water mouthwash.

1. Label the 15 ml conical tube containing 3 ml of water with your initials.
2. Take the water from the 15 ml conical tube into your mouth (don't swallow!), and chew gently on the inside of your cheeks while you swish the water around for 30–60 seconds.
3. Carefully expel the liquid back into the 15 ml conical tube or into the small paper cup.



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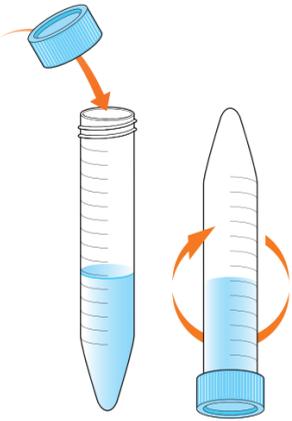
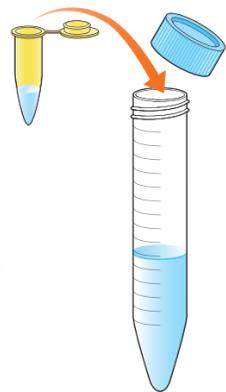


2

Cell Lysis and Proteolysis

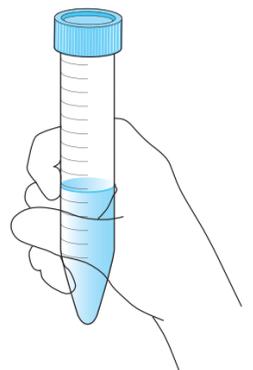
At this station, you will lyse your cheek cells and degrade the proteins with a protease.

1. Open the colored micro test tube; it contains a protease/salt/lysis buffer mixture. Pour entire contents into the 15 ml conical tube with the cells.



2. Place the cap on the tube, and **gently** invert your tube 5 times (don't shake it). Observe your tube — do you notice any changes?

3. Incubate for 5 minutes by warming the tube in your hand. This allows time for the protease to break down the proteins.



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3

DNA Precipitation

At this station, you will precipitate your DNA with the addition of alcohol.

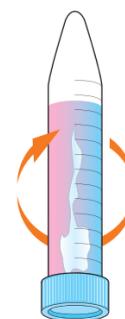
1. Hold your tube at a 45° angle and slowly fill tube with alcohol by gently pouring or pipetting the alcohol down the inside of the tube with your cells. Fill the tube to the 14 ml mark.



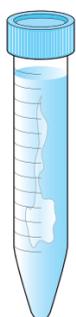
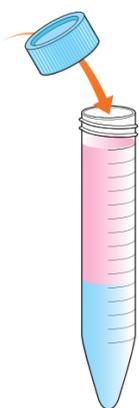
2. Cap your tube then let stand undisturbed for a few minutes at room temperature. What do you see?

(You will begin to see bubbles and white strands appearing at the interface between the alcohol and water phases — this is your DNA!)

3. Very gently tilt tube on its side, then turn it upright about 10 times until the water and alcohol phases are mixed.



4. Once mixed, the DNA should be fully visible as a “precipitate”.



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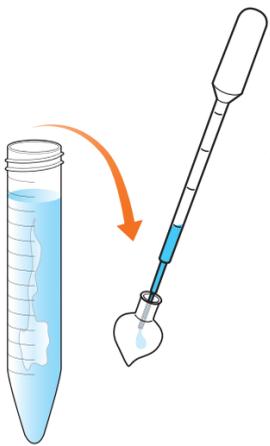
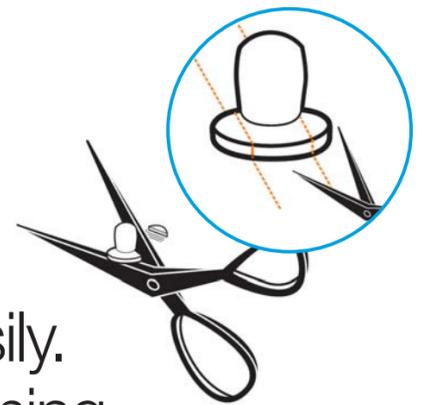


4

Necklace Assembly

At this station, you will assemble your DNA necklace (amulet).

1. Trim stoppers for the necklace — remove “ears” on stopper to allow silver cap to slide onto vial more easily. Put stopper back into vial after trimming.



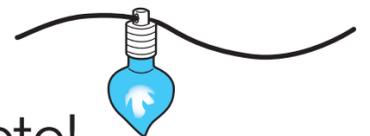
2. Using a disposable plastic transfer pipet, carefully transfer as much of your DNA and as little alcohol as possible into your glass vial. Fill the vial to no more than 2 mm from the top.

3. Firmly push the trimmed plastic stopper cap into the neck of the vial to seal the glass vial.



4. Apply a small drop of super glue to the inside of the silver cap. Press onto the vial and allow to dry for several minutes.

5. Slip the waxed cord through the silver cap. Your DNA necklace is now complete!



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